(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 663 623 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **94120417.4**

(51) Int. Cl.[6]: **G03G 15/00**

(22) Date of filing: **22.12.94**

(30) Priority: **14.01.94 US 182542**

(43) Date of publication of application:
19.07.95 Bulletin 95/29

(84) Designated Contracting States:
BE DE FR GB

(71) Applicant: **MILES INC. (an Indiana corporation)**
Agfa Division,
200 Ballardvale Street
Wilmington, MA 01887-1069 (US)

(72) Inventor: **Veiga, Luis F.**
200 Mountain Ave.,
Apt. &NUM;42
Malden,
MA 02148 (US)
Inventor: **Carlson, Gary L.**
141 Heidenrich Drive
Tewksbury, MA 01876 (US)

(74) Representative: **Strasse, Joachim, Dipl.-Ing.**
Strasse, Vonnemann & Partner
Balanstrasse 55
D-81541 München (DE)

(54) Field service remote communication system.

(57) A method is disclosed for tracking equipment (100) condition and usage for the purpose of scheduling or avoiding a maintenance visit by service personnel (150). A modem (110) is connected to the equipment (100), which allows for remote communication (140) with the equipment (100), and evaluation of the status of the equipment (100).

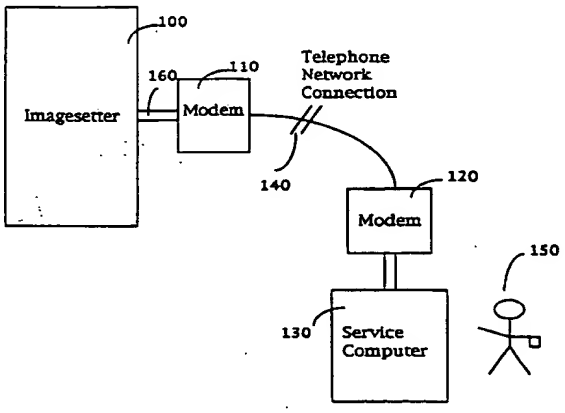


Figure 1

EP 0 663 623 A2

In the maintaining and servicing of complex equipment, there is a need to repair the machine if parts break (normal maintenance), and to change parts that are designed to wear after a given amount of time or usage (preventative maintenance). The invention disclosed pertains to machines that due to large size and weight can not be easily taken to a service center to repair a malfunction. Instead of transporting a large and heavy machine to a repair shop, a service representative will go to the site where the machine is installed, and repair it on site. The invention more specifically pertains to graphics imaging equipment, such as an imagesetter, that is not easily transportable.

When such a machine operates improperly or reports a diagnostic error, the customer normally calls the field service organization. The customer often can not use the machine until a service representative comes to the location of the machine and fixes the problem. The length of the machine "down time", that is the time the machine is not functional, depends on a number of factors including how soon the operator noticed the problem, how far the service representative is from the equipment site, the time of day that the problem is reported, and the schedule of the service representative. Since the equipment is very expensive, down time can be very expensive. A need exists, therefore, to minimize the machine down time. This can be done by providing the service representative with as much information as possible before the representative goes to the location of the machine.

On site repair is expensive because there is the transportation time overhead of the service representative necessary for the service representative to go to the customer location. The field service representative must bring the necessary tools and equipment to the customer location. There are a limited number of tools and parts that can be transported in a vehicle. If the service representative does not have the necessary tools or parts, the representative will have to go back to the central office to get the part and return to the customer location. This would make the repair even more expensive.

A common determination of the need for preventative maintenance is to measure the amount of activity of the machine, and to service the machine after it has had such use. There are various methods of measuring machine usage, methods include measuring the amount of time of machine operation or the amount of consumable material used by the machine. The problem with these methods is that two machines that operate a similar amount as measured by one of those methods may have components that have worn very differently. A machine that has operated for two years, and only used a cutter once every day, will wear out the cutting blade much differently than a machine that has operated for two years and has cut fifteen times a day.

It has become possible to measure the action of each wear part of the machine, and to report the status of the machine to the service representative when the representative services the machine. For example, the SELECTSET 5000 imagesetter sold by the Agfa Division of Miles, Inc. provides this information to the service representative when the representative is at the customer site. If the service representative arrives, however, and a component has sustained an amount of use that requires replacement of that part, the service representative may have to make another trip to the customer site to perform the maintenance. It would be desirable for the service representative to find out what parts the machine needs before the service call is made. It is an object of the invention to provide a service representative with such information before the service representative goes out to the customer site.

As machines have become increasingly computerized, it has become possible to connect a modem to a machine to allow digital communication with the machine over the telephone network. Prior art that uses modems in such a way are xerographic copiers that incorporate a modem to communicate with computers at a remote location.

In US. 5,184,179 a system for monitoring a xerographic copier is shown. The copier communicates the amount of paper processed, so that the customer can be billed for the number of copies made. There is discussion of a diagnostic error being transmitted, but this error is not specific, and not helpful for a preliminary analysis of any problems with the machine. The present invention is not restricted to a paper processing device. It is an object of the invention to communicate much more information than the paper count and a diagnostic in order to provide much more helpful information to the field service representative.

In US. 5,241,402 a system is disclosed that can communicate with a remote computer without interrupting the functionality of the reprographic machine. A remote user is able to detect errors and accomplish non-invasive tasks while the machine is running, but is unable to run a diagnostic test that affects the performance of the machine. The remote user is also unable to update the firmware of the machine while the machine is operating. It is an object of the present invention to accomplish extensive tasks such as diagnostics and manipulation of firmware from a site different from where the machine is located.

In US. 5,214,772 a system for monitoring multiple copiers at the same time is disclosed. A multiplexer is used to scan among the available

machines. The monitoring computer may be in a remote location, but the copiers must be in the same location. It is an object of the present invention to allow remote communication with more than one imagesetter, with each imagesetter at a different customer site. The monitoring of the imagesetters is not continuous, but rather is performed on a regular intermittent basis.

The prior art discusses xerographic devices, not graphic imagesetters. The prior art does not disclose a method for communications with a graphics imagesetter from a service location. There are many differences between a xerographic copier and a graphics imagesetter, so the graphic imagesetter requires specialized methods. The prior art does not include methods that would increase the efficiency of a field service representative by providing the capability of detailed remote malfunction diagnosis. Also, the prior art does not describe a method of automatically monitoring the functionality of one or more imagesetters from a remote location, and automatically determining the need for service. The prior art does not describe a method of reading a log of errors that is stored internally in an imagesetter.

It is accordingly an object of the invention to provide a method and apparatus that eliminates the restrictions of the prior art systems.

The present invention incorporates a modem in an imagesetter to enable external data communication over a telephone network. A service computer can upload and download data to the imagesetter, and that data can be firmware, configuration data, or error information. The imagesetter itself can request service, either because the imagesetter experienced a diagnostic error, or for required preventative maintenance. The service computer can instruct the imagesetter to execute a diagnostic test, as well as poll the imagesetter to determine the operating status of the imagesetter.

The objects and features of the invention will best be understood from a detailed description of a preferred embodiment, selected for purposes of illustration, and shown in the accompanying drawings, in which:

FIG. 1 is a block diagram that shows a typical communications session between an imagesetter and a service computer;

FIG. 2 is a detailed flowchart that shows the method of firmware download from the service computer to the imagesetter;

FIG. 3 is a detailed flowchart that shows the method of firmware upload from the imagesetter to the service computer;

FIG. 4 is a detailed flowchart that shows the method of imagesetter configuration download from the service computer to the imagesetter;

FIG. 5 is a detailed flowchart that shows the method of imagesetter configuration upload from the imagesetter to the service computer;

FIG. 6 is a detailed flowchart that shows the imagesetter connecting to the service computer and reporting a diagnostic error;

FIG. 7 is a detailed flowchart that shows the imagesetter connecting to the service computer and requesting preventative maintenance;

FIG. 8 is a detailed flowchart that shows the service computer requesting the imagesetter to execute and report the results of a diagnostic test;

FIG. 9 is a detailed flowchart that shows the method of error log upload from the imagesetter to the service computer; and,

FIG. 10 is a detailed flowchart that shows the service computer method of automatic condition tracking of one of a plurality of imagesetters.

FIG. 1 shows an imagesetter 100 connected to a modem 110 via a serial connection 160. The modem 110 is connected through a telephone network connection 140 to another modem 120 which is connected to a Field Service Computer 130.

The service computer is operated by a Field Service Representative 150. FIG. 1 shows the connection that is made between the Field Service computer and the imagesetter. It is through this connection that the communication takes place. The Field Service Computer can be anywhere in the world relative to the imagesetter, as long as the telephone network between the modems exists.

The imagesetter 100 can be any kind of graphics imaging device. It can image on film and on paper. It may require media processing using chemicals, or no processing at all. The imagesetter has a digital serial interface that allows it to be connected 160 to a modem 110. In the preferred embodiment, the imagesetter is an SELECTSET AVANTRA imagesetter sold by the Agfa Division of Miles, Inc. The modem 110 can be any modem that is commercially available.

In the preferred embodiment, the modem is "Hayes compatible" and allows telephone dialing and answering under host control. In the preferred embodiment, the modem is a FMM9696 MINIMODEM sold by GVC.

In FIG. 2 the process of downloading firmware is shown. The service center has a database containing the telephone numbers of the installed imagesetters. The service center computer initiates

the call to a particular imagesetter by dialing the telephone number of the imagesetter. The imagesetter modem answers, and a data connection 200 is established between the service center computer and the imagesetter. Upon connection, the service center sends a command to the imagesetter to enter service mode 202. The imagesetter receives the command to enter service mode, and halts the normal operation of the imagesetter at 204. The imagesetter posts a message to the operator control panel to indicate that it is in service mode. The service mode command instructs the imagesetter to suspend all current activities in the imagesetter.

The service center computer issues a command to tell the imagesetter to prepare to receive new firmware 206. In the preferred embodiment, the imagesetter will erase the Flash ROM(s) on the imagesetter in which the firmware is stored. The imagesetter controller executes loader firmware which is stored in a ROM other than the firmware flash ROM. When the Flash ROM erase sequence is complete, the service center computer issues the command to accept firmware data. The firmware is transmitted in an all ASCII character format which is translated by the imagesetter. Included in the transmission sequence are handshake, error checking and protocol conversions 208. As the files are translated, the data is programmed into the flash ROM 210. Once the data transfer is finished, the service center sends a command to restart the imagesetter 214. This command causes the imagesetter to return to its normal operational mode.

In FIG. 3 the process of uploading firmware from the imagesetter is shown. This is useful to determine if the software is specific to an individual imagesetter. In the preferred embodiment, sometimes during machine service the electronics component that contains the firmware needs to be changed. The service representative doesn't have the same firmware stored on the replacement part. In this case the firmware can be uploaded from the machine to the service center computer, and then downloaded again into the new component after the repair. The upload process is similar to the download, except data transfer is in the other direction, and there is no erasing or other preparing of the Flash ROM.

A data connection 300 is established between the service center computer and the imagesetter. Upon connection, the service center sends a command to the imagesetter to enter service mode 302. The imagesetter receives the command to enter service mode, and halts the normal operation of the imagesetter at 304. The imagesetter posts a message to the operator control panel to indicate that it is in service mode and all current activities in the imagesetter are suspended. The service center computer issues a command for the imagesetter to upload 306 the firmware that is on the imagesetter. The firmware is read 308 and translated into an all ASCII character format by the imagesetter for transmission. Included in the transmission sequence are handshake, error checking and protocol conversions 310. Once the data transfer is finished, the service center sends a command to restart the imagesetter 314. This command causes the imagesetter to return to its normal operational mode.

In FIG. 4 the process of setting the imagesetter configuration is shown. This process is very similar to the download of firmware. Instead of packets of executable programs, however, the service computer will send packets of data for the programs to act upon. This data will describe the configuration of the machine, and the data are called the machine parameters. Again, a data connection 400 is established between the service center computer and the imagesetter. Upon connection, the service center sends a command to the imagesetter to enter service mode 402. The imagesetter receives the command to enter service mode, and halts the normal operation 404 of the imagesetter. The service center computer issues a command for imagesetter to accept new machine parameters 406. The machine parameters are transmitted in an all ASCII character format which is translated by the imagesetter. Included in the transmission sequence are handshake, error checking and protocol conversions 408 that are also translated by the imagesetter. As the files are translated, the data is programmed into the machine parameters storage locations. In the preferred embodiment, the parameters are stored in electronically erasable ROM 410. Once the data transfer is finished, and is successful 412 the service center sends a command to restart 414 the imagesetter. This command causes the imagesetter to return to its normal operational mode.

In FIG. 5 the process of uploading machine parameters from the imagesetter is shown. This procedure is used for storing elsewhere besides the machine the individual parameters that have been set on the machine. It is also useful for determining the configuration of the machine. If there is a component failure and the machine loses the configuration set up in manufacturing, or if during machine service component that contains the firmware needs to be changed, the configuration is uploaded from the machine to the service center computer. After the repair, the configuration is downloaded into the system as shown in Fig. 4, and described above. The upload of configuration is similar to the download of configuration information, except that the data transfer is in the reverse direction.

Referring then to FIG. 5, a data connection 500 is established between the service center computer and the imagesetter. Upon connection, the service center sends a command to the imagesetter to enter service mode 502. The imagesetter receives the command to enter service mode, and halts the normal operation 504 of the imagesetter. The imagesetter posts a message to the operator control panel to indicate that it is in service mode. The service mode command instructs the imagesetter to suspend all current activities in the imagesetter.

The service center computer issues a command 506 for the imagesetter to send the imagesetter configuration to the service computer. The data is translated from an all ASCII character format by the imagesetter. Included in the transmission sequence are handshake, error checking and protocol conversions 510. When the data transfer is finished, the service center sends a command 514 to restart the imagesetter. This command causes the imagesetter to return to its normal operational mode.

FIG. 6 shows a method of reporting errors when the system is turned on. Whenever the imagesetter is reset 600, from a power-on condition or initiated by a software reset request command, a series of machine diagnostics 602 are performed. If a failure 604 occurs due to malfunctioning parts, the imagesetter initiates a field service request by starting a monitor task 606. The monitor task passes control to the modem setup task 608, which in turn schedules the dial-out task 610. The dial-out task contacts its assigned field service center and does a status check 612 to determine if the service center is listening. Upon successful connection, a login handshake process 614 is followed to authenticate the site and if login is successful control is passed to the command processor task 616, which will report the error to the field service center computer.

In FIG. 7, a method for having the machine alert the service office if the machine needs preventative maintenance is shown. The operational status of the imagesetter is stored in a non-volatile data base 700. This data base is updated every time an image is processed by the imagesetter. Preventative maintenance data containing statistically derived mean time between failures of the imagesetter sub-assemblies are also stored in a data base 702. A monitor task 704 continuously compares the operational status against preventative maintenance data. When a trigger condition occurs, the monitor task sets up the modem 706 and initiates a call out sequence 708 to its assigned remote site. Once a connection is established 710, the call-out task connects to into the remote site using a known password for authentication 712. If a remote site is busy, the call-out task 708 sleeps for 20 minutes and tries again. If after 10 tries the site does not respond it will wait for 1 hour between tries. After a successful login, the imagesetter sends information which is processed by the service computer. This information indicates the exact nature of the component that needs service.

In FIG. 8, a method is shown by which the service center computer can establish a data connection with an installed imagesetter and execute a series of tests to determine the working condition of the imagesetter. The service center computer dials the telephone number, and establishes a data connection with the modem connected to the imagesetter. The imagesetter is actively listening for incoming calls. When an incoming call is detected, the command processor task 800 is activated. Upon connection, the service center sends a command to the imagesetter to enter service mode 802. The imagesetter receives the command to enter service mode, and halts the normal operation 804 of the imagesetter. The imagesetter posts a message to the operator control panel to indicate that it is in service mode. The service mode command instructs the imagesetter to suspend all current activities in the imagesetter. The service center computer issues a command to tell the imagesetter to prepare to execute diagnostic tests 806 and sends a diagnostic test request. The protocol converter 808 retrieves the test packet and the required test 810 is executed. If the diagnostic test is able to complete, then the results (pass or fail, and detailed error information if there is a failure) are sent to the service computer.

In FIG. 9 the process of uploading error log information from the imagesetter is shown. This is procedure is used for obtaining a history of run-time errors on the machine. This is useful for a service representative who is going to make a field visit to the machine site. The representative can query the machine for the recent run-time errors. For example, if the machine has recently had a number of cutter jams, the service representative will be able to bring the necessary equipment to service the cutter to the customer site. The upload of the error log information is similar to the upload of configuration information, except that the data transferred is different.

Referring to FIG. 9, a data connection is established between the service center computer and the imagesetter. Upon connection, the service center sends a command 902 to the imagesetter to enter service mode. The imagesetter receives the command to enter service mode, and halts the normal operation 904 of the imagesetter. The imagesetter posts a message to the operator control panel to indicate that it is in service mode. The service center computer issues a command 906 for

the imagesetter to send the error log information to the service computer. The data is translated from an all ASCII character format by the imagesetter. Included in the transmission sequence are handshake, error checking and protocol conversions 910. When the data transfer is finished, the service center sends a command to restart 914 the imagesetter. This command causes the imagesetter to return to its normal operational mode.

In FIG. 10 a method is shown by which the service center computer can automatically monitor the status of all the imagesetters that it knows about. In the preferred embodiment, this method is useful for monitoring the status of the machines, so that service can provide a preemptive maintenance call. If the machine is starting to have problems in a certain area, the service center computer may notice the problem before the customer. Field service can schedule a service call before the customer notices the problem. The service center computer gets the telephone number of the next machine from a machine database 1000. The service center computer dials the phone number of the imagesetter and establishes a data connection 1002 with that imagesetter. After a verification of the connection 1004, the service center computer logs on to the imagesetter by way of a predetermined password 1006. The service center computer requests that the imagesetter send status information. The status information includes the operating status of the machine, and machine statistics. The service center computer will store the information in the machine data base. If the service center computer finds a problem, it can automatically request other information from the imagesetter like the error log information, or the imagesetter configuration that will also be stored in the database.

While this invention has been described with reference to a specific embodiment, it will be understood by those skilled in the art that various modifications, substitutions, omissions and changes may be made and oequivalents may be substituted without departing from the true spirit of the invention. Accordingly, it is intended that the scope of the present invention be limited solely by the following claims.

Claims

1. A method of loading information into an imagesetter (100) located at a customer site that is connected to a modem (110), comprising the steps of:
   a) establishing a data connection (200) between the imagesetter and a service computer located at a service location;
   b) enabling a service mode (202) by sending commands via the data connection from the service computer to the imagesetter;
   c) preparing the imagesetter (206) to receive the information by sending commands from said service computer to said imagesetter via said data connection;
   d) transferring data packets (208, 210) containing the information from the service computer to said imagesetter via said data connection;
   e) storing said information in the imagesetter.

2. The method of claim 1 where the information loaded into the imagesetter is firmware.

3. The method of claim 2 where the firmware is loaded into Flash ROM.

4. The method of claim 1 where the information loaded into the imagesetter is configuration information.

5. The method of claim 4 where the configuration information is loaded into electronically erasable ROM.

6. A method of reading information stored in an imagesetter (100) located at a customer site that is connected to a modem (110), comprising the steps of:
   a) establishing a data connection (300) between the imagesetter and a service computer (130) located at a service location;
   b) enabling a service mode (302) by sending commands via the data connection from the service computer to the imagesetter;
   c) preparing the imagesetter to output the information (306) by sending commands from said service computer to said imagesetter via said data connection; and
   d) transferring data packets (308, 310) containing the information from the imagesetter to the service computer via the data connection.

7. The method of claim 6 where the information read from the imagesetter is firmware.

8. The method of claim 7 where the firmware is read from Flash ROM on the imagesetter.

9. The method of claim 6 where the information read from the imagesetter is configuration information.

10. The method of claim 9 where the configuration information is read from electronically erasable ROM on the imagesetter.

11. The method of claim 9, further comprising the step of:
a) storing the machine parameters on the service computer.

12. A method of saving and restoring the configuration of an imagesetter (100), comprising the steps of:
a) establishing a data connection (400, 500) between the imagesetter (100) and a service computer (130);
b) enabling a service mode (502) by sending commands via the data connection from the service computer to the imagesetter;
c) preparing the imagesetter to output machine parameters by sending commands (506) from said service computer to said imagesetter via said data connection (500); and
d) transferring data packets (508, 510) containing the machine parameters from the imagesetter to the service computer via the data connection, thereby determining the configuration of the imagesetter; and,
e) storing the machine parameters on the service computer (130);
f) transferring data packets (408, 410) containing the information from the service computer to said imagesetter via said data connection (400);
g) storing said information in the imagesetter.

13. The method of claim 6 where the information read from the imagesetter is imagesetter internal error log information (700).

14. The method of claim 13, further comprising the step of: determining the need for service (704) of said imagesetter based on said error log information (700).

15. The method of claim 6 where the information read from the imagesetter is status information.

16. The method of claim 15, further comprising the steps of:
a) periodically establishing said data connection (708, 710); and,
b) automatically determining the need for service with said computer (712, 714) at a service location by analyzing said status information (700).

17. A method of automatically tracking the condition of an imagesetter (100) connected to a modem (110) and located at a customer site for the purpose of scheduling a service call, comprising the steps of:
a) performing a plurality of diagnostic tests (806) on the imagesetter;
b) establishing a data connection (800) between the imagesetter and a computer (130) at a service location if at least one of the plurality of diagnostic tests fails;
c) reporting said at least one diagnostic test failure (812) to the computer at the service location; and,
d) determining the need for service (802) with said computer at the service location in response to said reporting.

18. A method of automatically tracking the condition and usage of an imagesetter (100) connected to a modem (110) and located at a customer site for the purpose of scheduling a service call, comprising the steps of:
a) periodically automatically evaluating imagesetter usage by comparing the imagesetter usage with life expectancy statistics;
b) establishing a data connection (1000, 1002) between a computer (130) at a service location and the imagesetter if the use of a component has passed the expected life expectancy;
c) transferring information (1008) about the component to the computer at a service location; and
d) determining the need for service in response to said transferred information.

19. A method of testing from a service location the functionality of an imagesetter (100) connected to a modem (110) and located at a customer site, comprising the steps of:
a) establishing a data connection (800) between a computer (130) at a service location and the imagesetter,
b) commanding the imagesetter to execute a diagnostic test(806) by sending an instruction to the imagesetter via the data connection;
c) executing the diagnostic test (810) on the imagesetter;
d) reporting the results of the test (814) to the computer at the service location; and
e) determining the need for service of said imagesetter based on the results of the diagnostic test.

20. A system for loading information into an imagesetter (100) located at a customer site that is connected to a modem (110), said system comprising:
    a) means for establishing a data connection (200) between the imagesetter and a service computer located at a service location;
    b) means for enabling a service mode (202) by sending commands via the data connection from the service computer to the imagesetter;
    c) means for preparing the imagesetter (206) to receive the information by sending commands from said service computer to said imagesetter via said data connection;
    d) means for transferring data packets containing the information (208, 210) from the service computer to said imagesetter via said data connection
    e) means for storing said information in the imagesetter.

21. A system for reading information stored in an imagesetter (100) located at a customer site that is connected to a modem (110), said system comprising:
    a) means for establishing a data connection (300) between the imagesetter and a service computer (130) located at a service location;
    b) means for enabling a service mode (302) by sending commands via the data connection from the service computer to the imagesetter;
    c) means for preparing the imagesetter to output the information (306) by sending commands from said service computer to said imagesetter via said data connection; and
    d) means for transferring data packets containing the information (308, 310) from the imagesetter to the service computer via the data connection.

22. A system for automatically tracking the condition of an imagesetter (100) connected to a modem (110) and located at a customer site for the purpose of scheduling a service call, said system comprising:
    a) means for performing a plurality of diagnostic tests (806) on the imagesetter;
    b) means for establishing a data connection (800) between the imagesetter and a computer (130) at a service location if at least one of the plurality of diagnostic tests fails;
    c) means for reporting said at least one diagnostic test failure (812) to the computer at the service location; and,
    d) means for determining the need for service (802) with said computer at the service location in response to said reporting.

23. A system for automatically tracking the condition and usage of an imagesetter (100) connected to a modem (110) and located at a customer site for the purpose of scheduling a service call, said system comprising:
    a) means for periodically automatically evaluating imagesetter usage by comparing the imagesetter usage with life expectancy statistics;
    b) means for establishing a data connection (1002) between a computer (130) at a service location and the imagesetter if the use of a component has passed the expected life expectancy;
    c) means for transferring information (1008) about the component to the computer at a service location; and
    d) means for determining the need for service in response to said transferred information.

24. A system for testing from a service location the functionality of an imagesetter (100) connected to a modem (110) and located at a customer site, said system comprising:
    a) means for establishing a data connection (800) between a computer (130) at a service location and the imagesetter,
    b) means for commanding the imagesetter to execute a diagnostic test (806) by sending an instruction to the imagesetter via the data connection;
    c) means for executing the diagnostic test (810) on the imagesetter;
    d) means for reporting the results (814) of the test to the computer at the service location; and
    e) means for determining the need for service of said imagesetter based on the results of the diagnostic test.

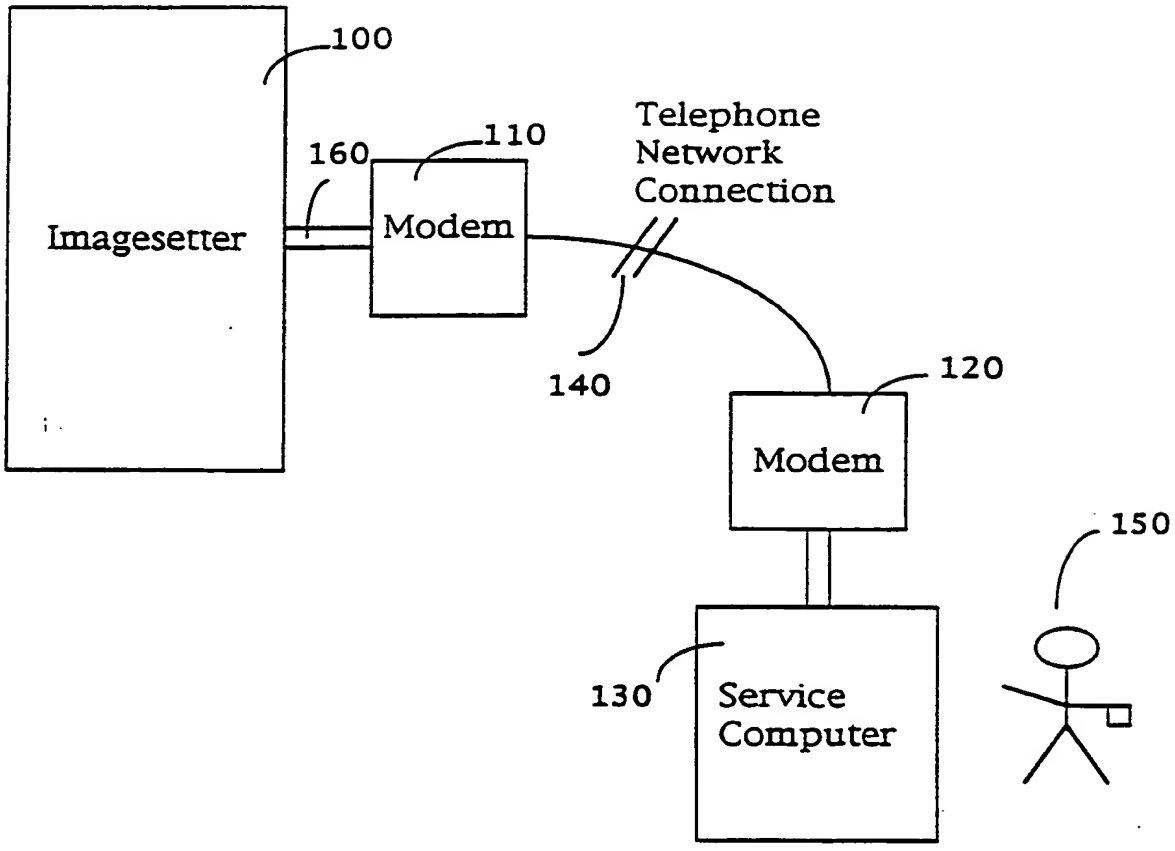

100
Imagesetter
160
110
Modem
Telephone
Network
Connection
140
120
Modem
150
130
Service
Computer

Figure 1

Figure 2

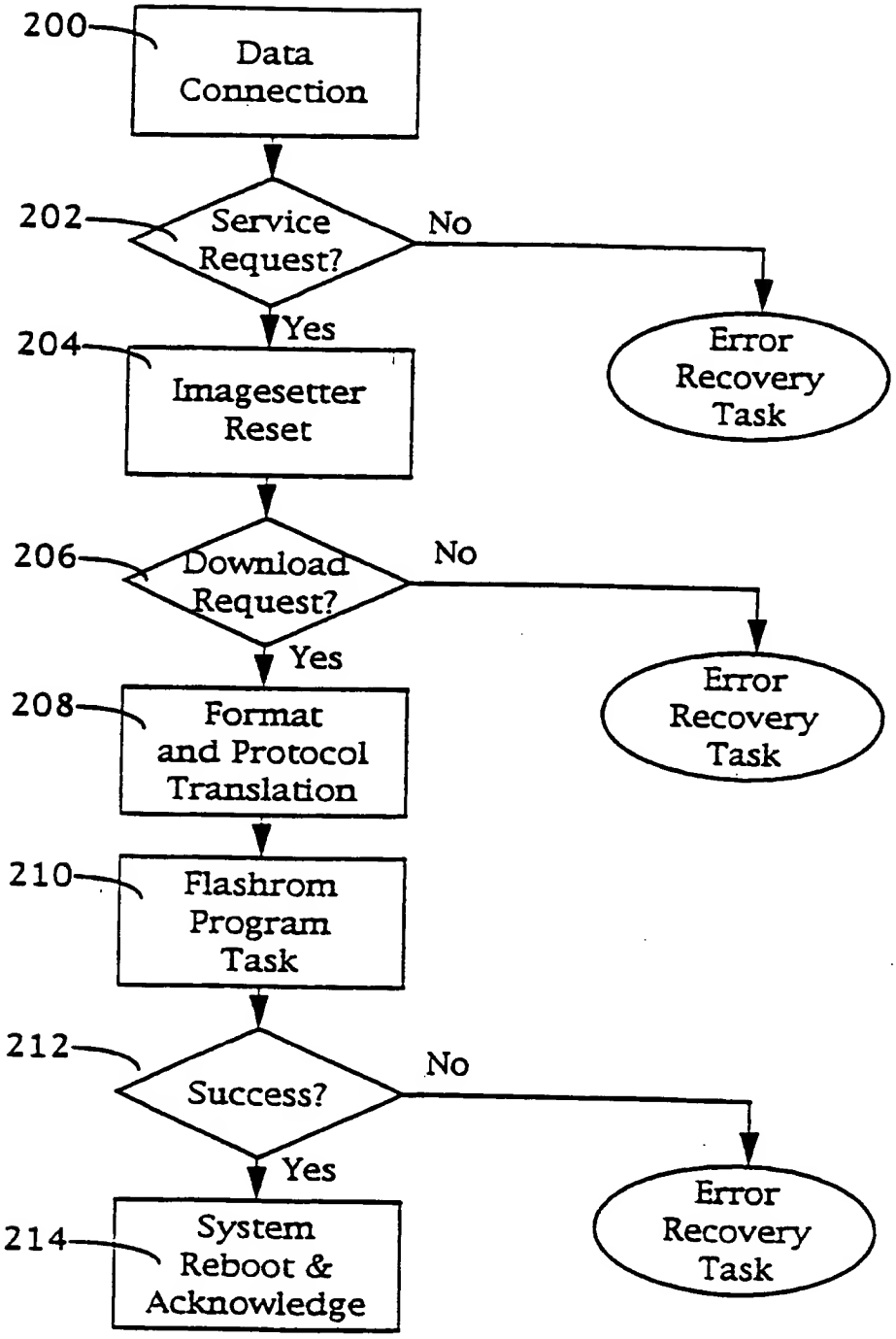

200
Data Connection
202
Service Request?
No
Error Recovery Task
Yes
204
Imagesetter Reset
206
Download Request?
No
Error Recovery Task
Yes
208
Format and Protocol Translation
210
Flashrom Program Task
212
Success?
No
Error Recovery Task
Yes
214
System Reboot & Acknowledge

Figure 3

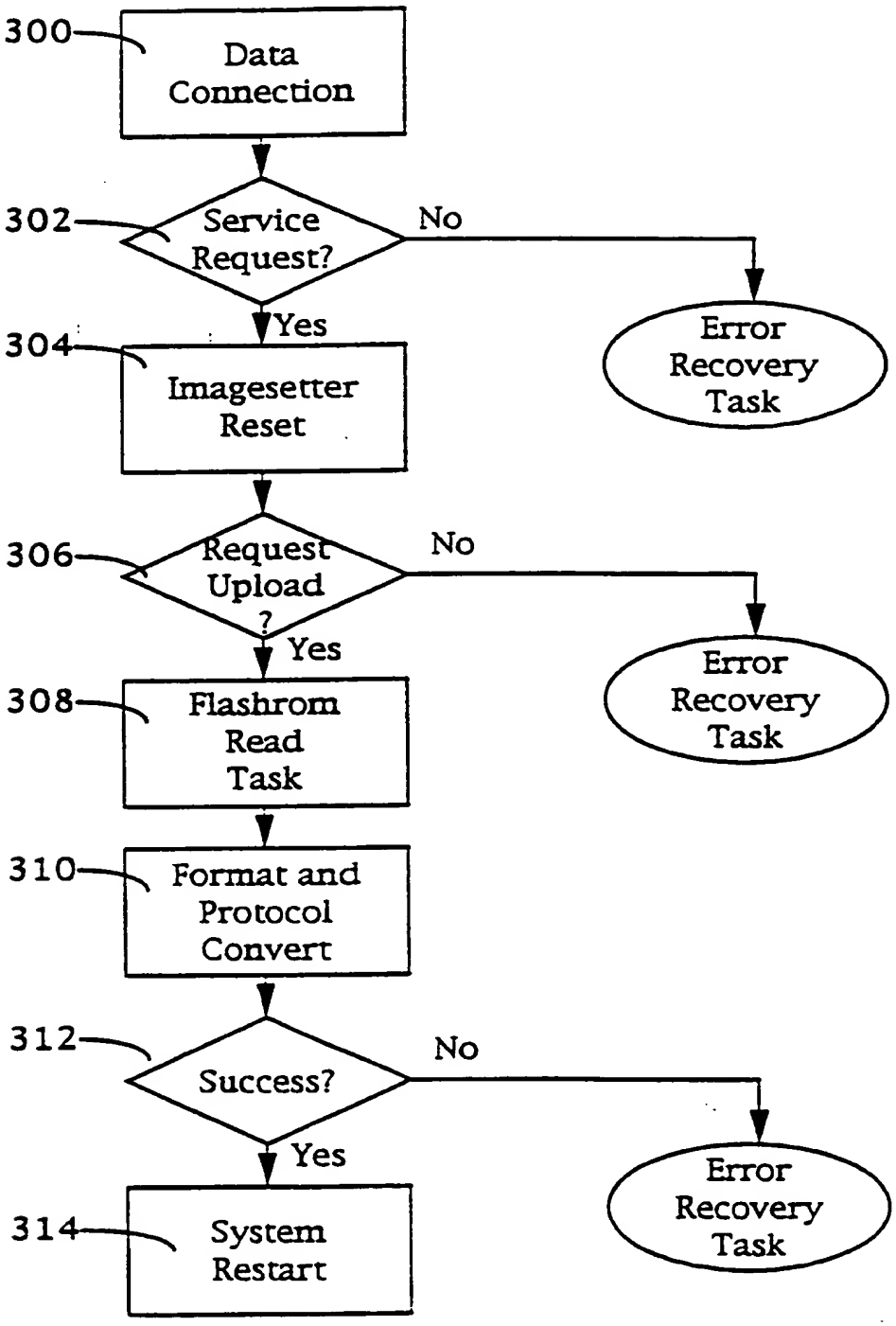

300
Data Connection
302
Service Request?
No
Error Recovery Task
Yes
304
Imagesetter Reset
306
Request Upload ?
No
Error Recovery Task
Yes
308
Flashrom Read Task
310
Format and Protocol Convert
312
Success?
No
Error Recovery Task
Yes
314
System Restart

Figure 4

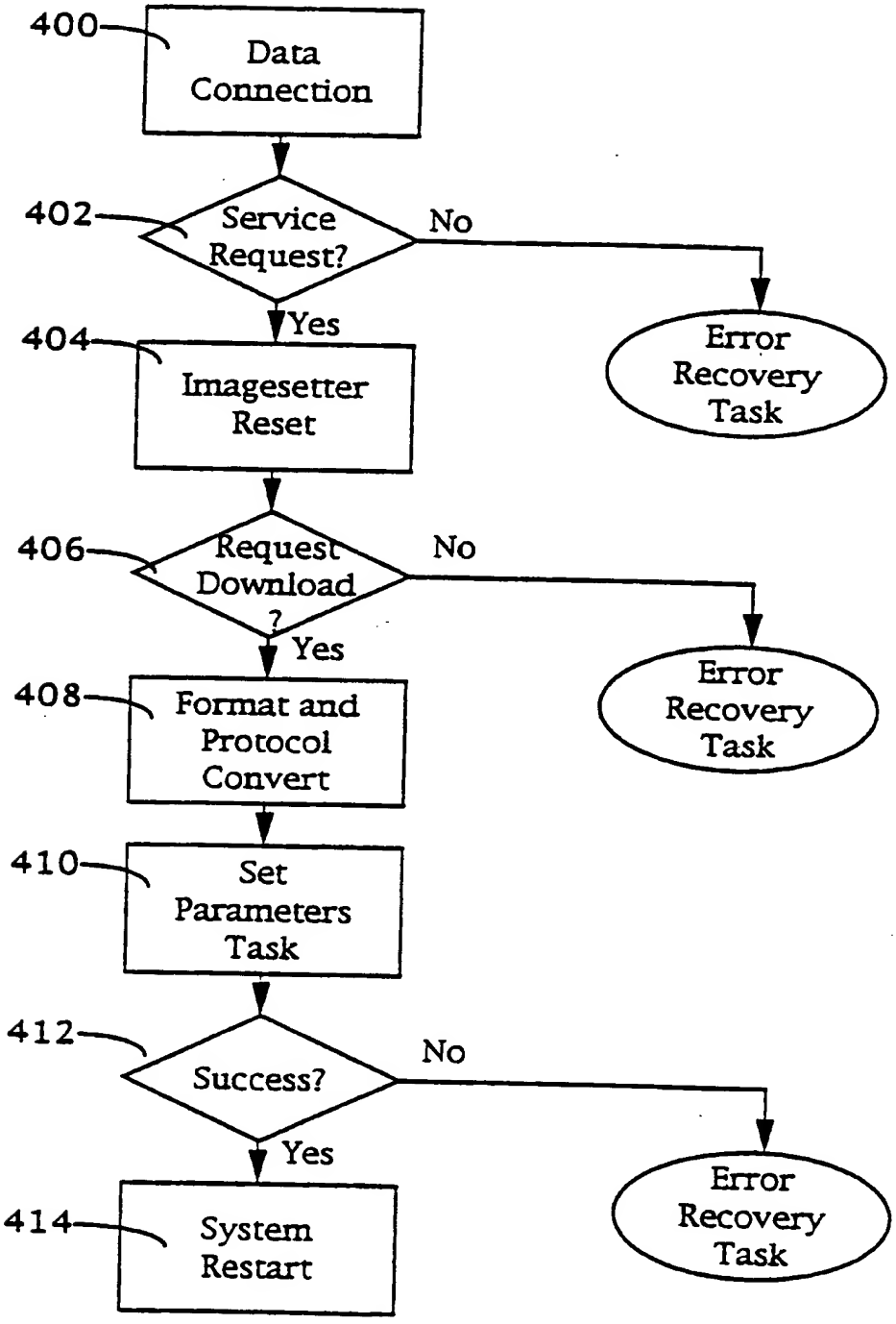

400
Data Connection
402
Service Request?
No
Yes
Error Recovery Task
404
Imagesetter Reset
406
Request Download ?
No
Yes
Error Recovery Task
408
Format and Protocol Convert
410
Set Parameters Task
412
Success?
No
Yes
Error Recovery Task
414
System Restart

Figure 5

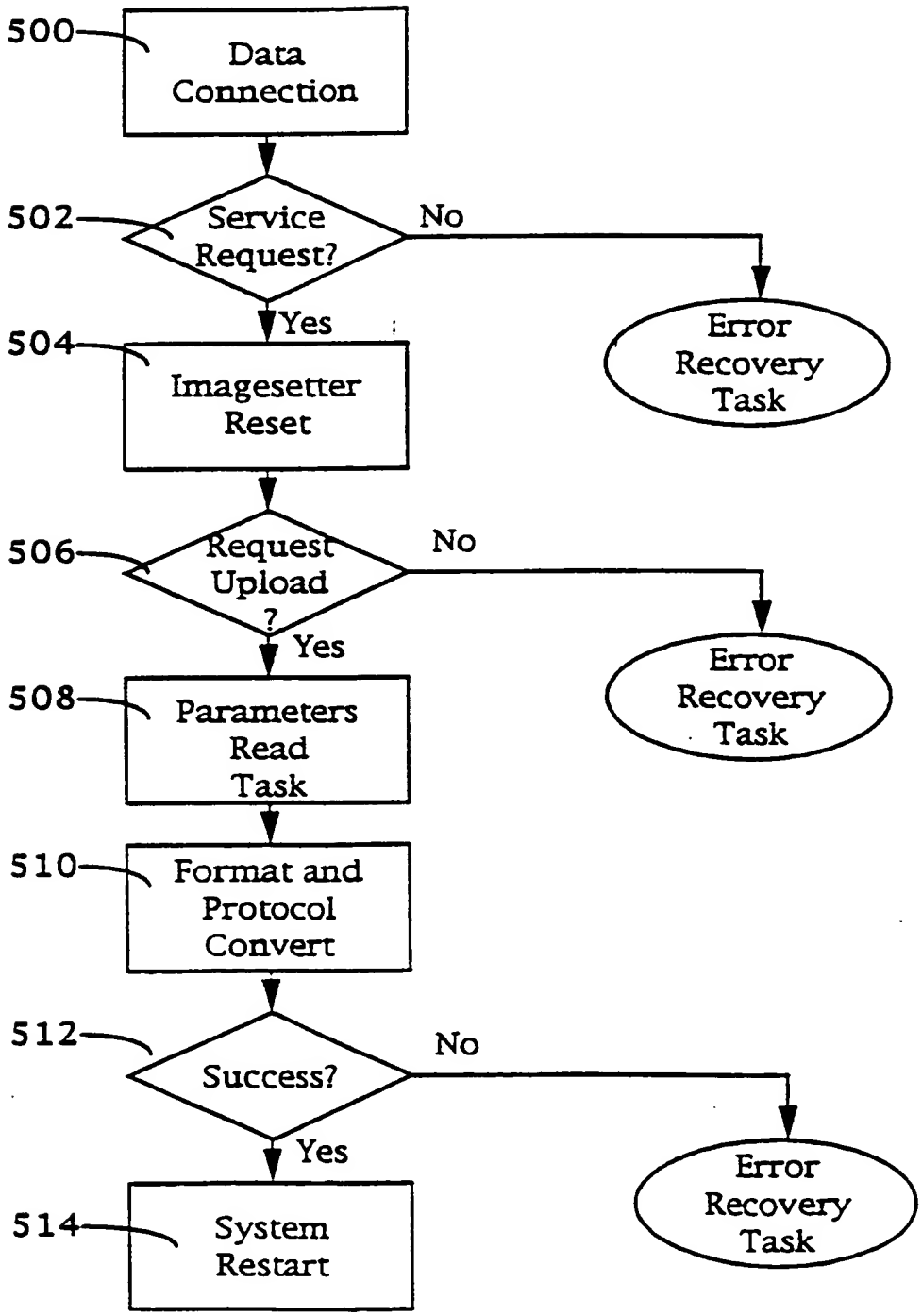

500
Data Connection
502
Service Request?
No
Error Recovery Task
Yes
504
Imagesetter Reset
506
Request Upload ?
No
Error Recovery Task
Yes
508
Parameters Read Task
510
Format and Protocol Convert
512
Success?
No
Error Recovery Task
Yes
514
System Restart

Figure 6

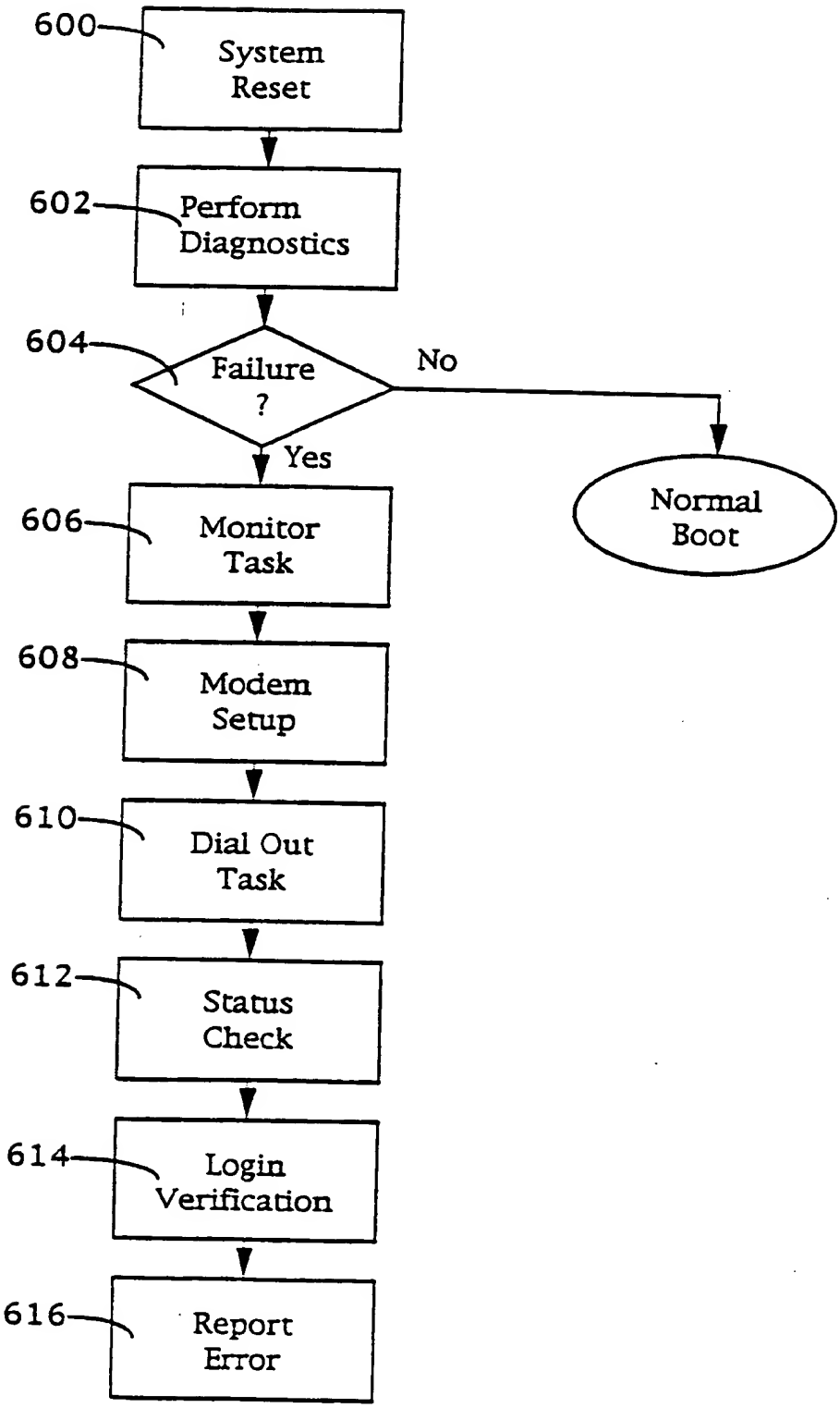

600
System Reset
602
Perform Diagnostics
604
Failure ?
No
Yes
Normal Boot
606
Monitor Task
608
Modem Setup
610
Dial Out Task
612
Status Check
614
Login Verification
616
Report Error

Figure 7

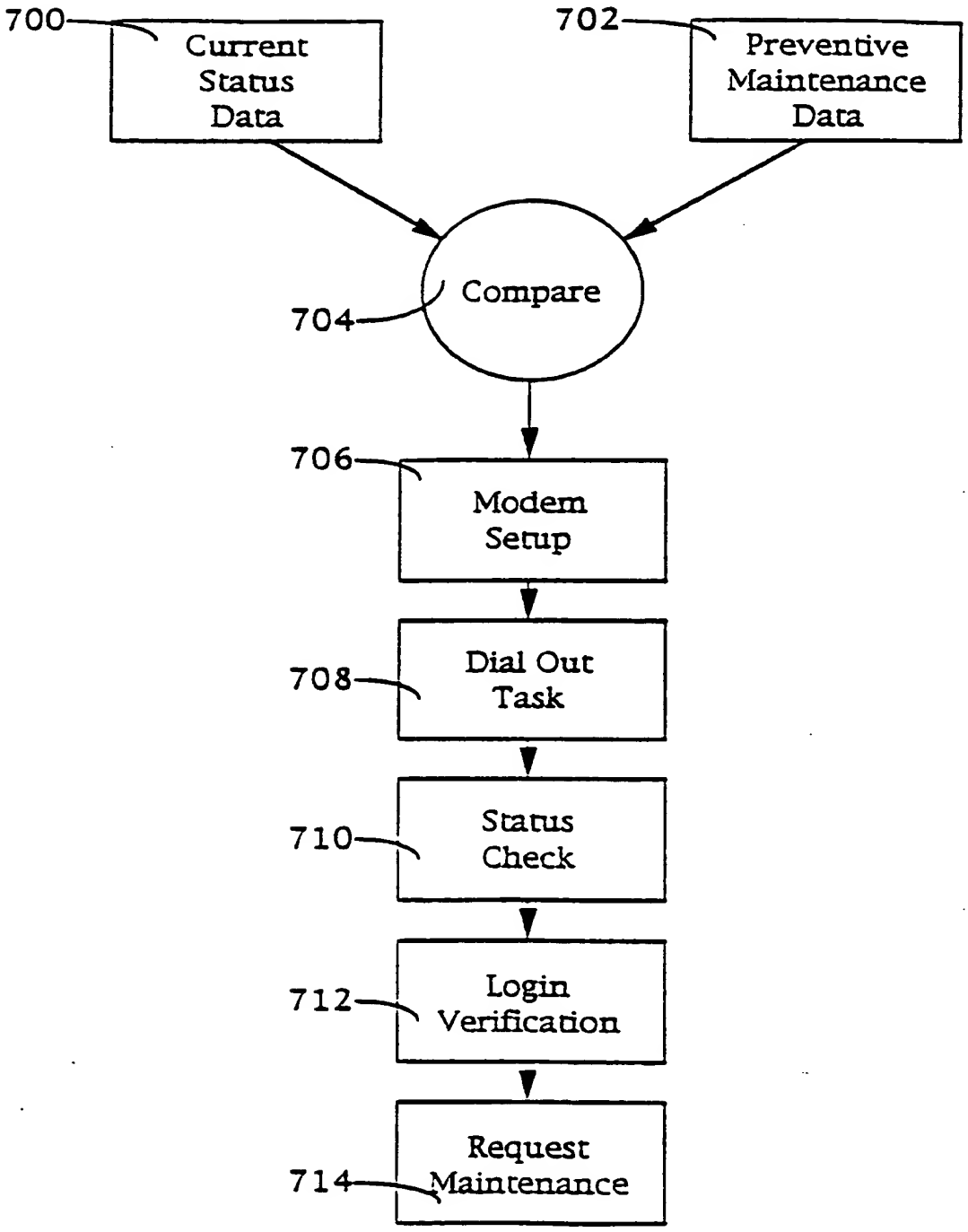

700
Current Status Data
702
Preventive Maintenance Data
Compare
704
706
Modem Setup
708
Dial Out Task
710
Status Check
712
Login Verification
714
Request Maintenance

Figure 8,

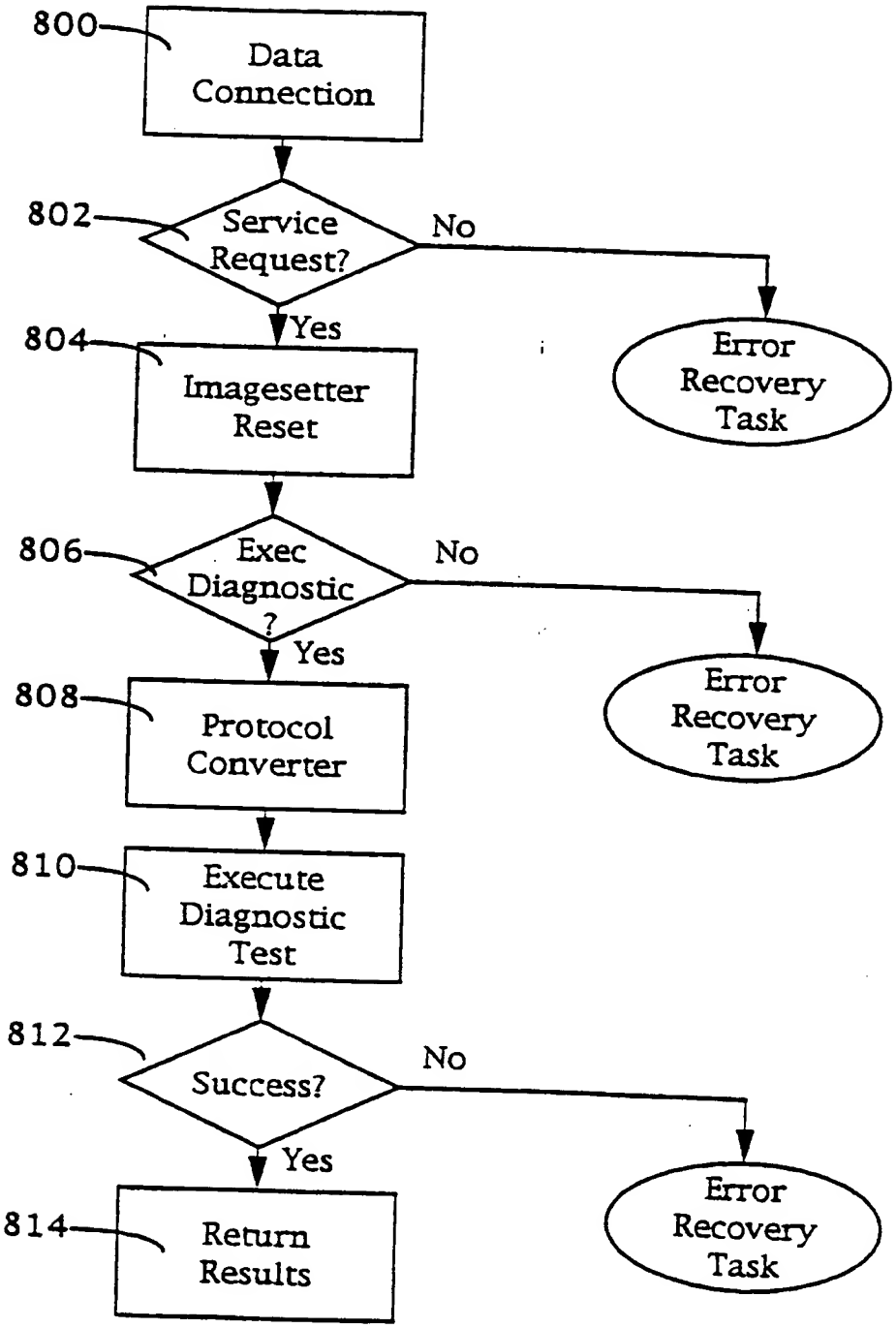

800
Data Connection
802
Service Request?
No
Yes
Error Recovery Task
804
Imagesetter Reset
806
Exec Diagnostic ?
No
Yes
Error Recovery Task
808
Protocol Converter
810
Execute Diagnostic Test
812
Success?
No
Yes
Error Recovery Task
814
Return Results

Figure 9

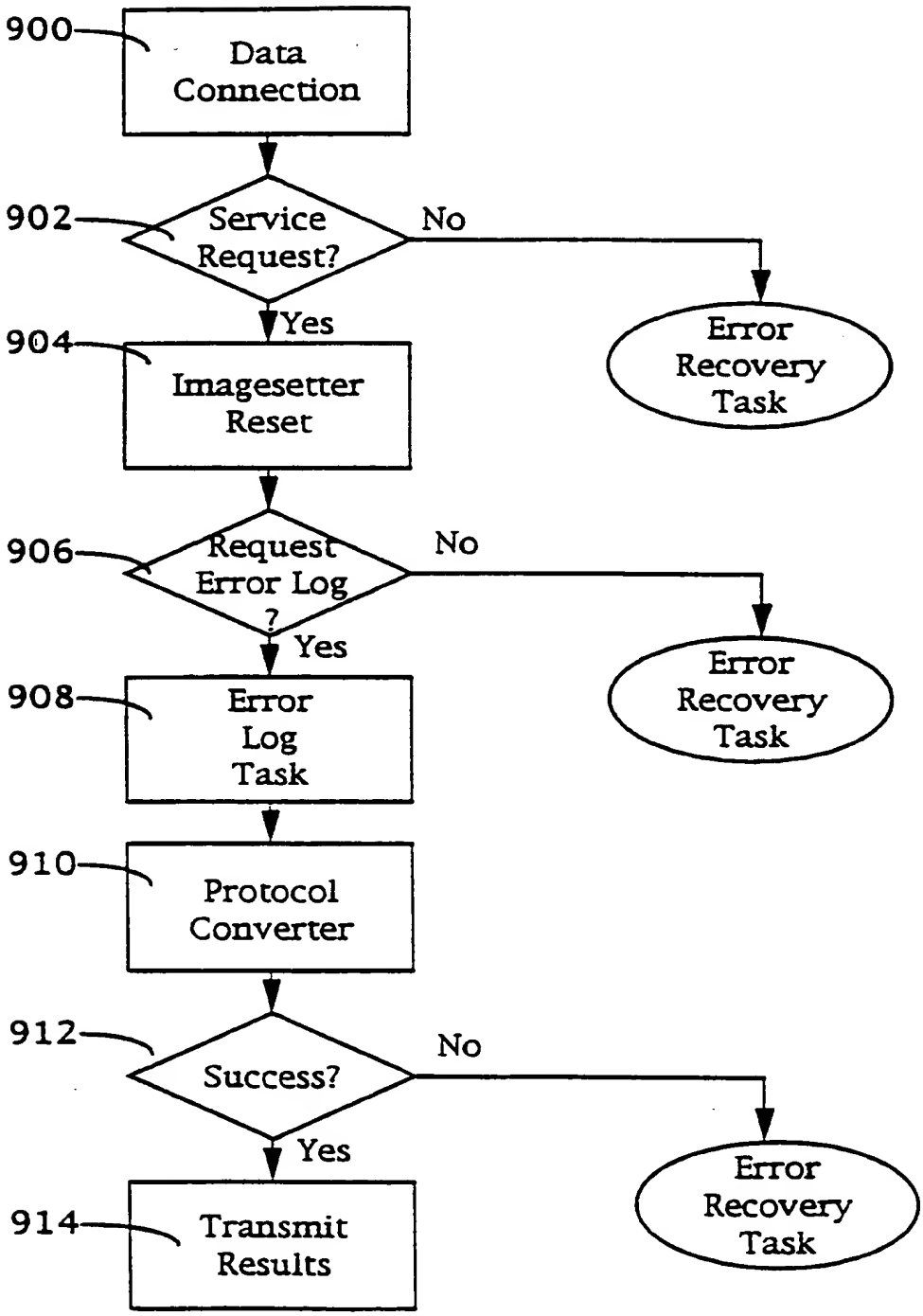
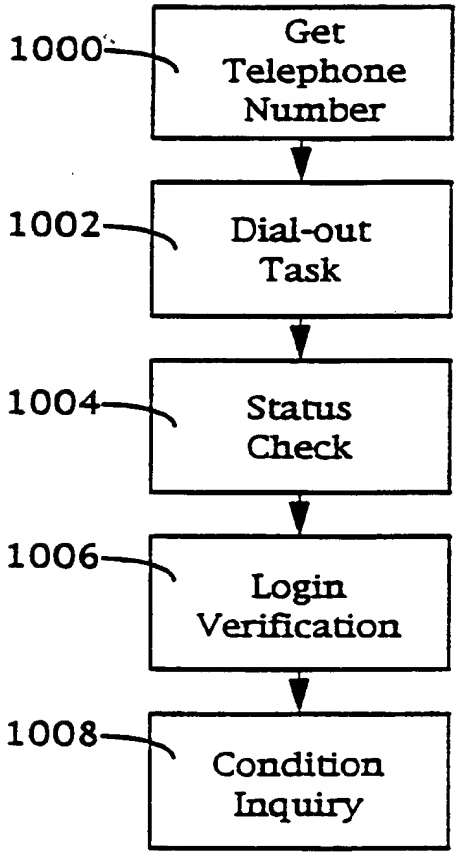

900
Data Connection
902
Service Request?
No
Error Recovery Task
Yes
904
Imagesetter Reset
906
Request Error Log ?
No
Error Recovery Task
Yes
908
Error Log Task
910
Protocol Converter
912
Success?
No
Error Recovery Task
Yes
914
Transmit Results

Figure 10,



(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 663 623 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
30.10.1996 Bulletin 1996/44

(43) Date of publication A2:
19.07.1995 Bulletin 1995/29

(21) Application number: **94120417.4**

(22) Date of filing: **22.12.1994**

(51) Int. Cl.[6]: **G03G 15/00**

(84) Designated Contracting States:
BE DE FR GB

(30) Priority: **14.01.1994 US 182542**

(71) Applicant: **Bayer Corporation**
Wilmington, MA 01887-1069 (US)

(72) Inventors:
- **Veiga, Luis F.**
  Malden, MA 02148 (US)
- **Carlson, Gary L.**
  Tewksbury, MA 01876 (US)

(74) Representative: **Strasse, Joachim, Dipl.-Ing.**
Strasse & Hofstetter,
Balanstrasse 55
81541 München (DE)

(54) Field service remote communication system

(57) A method is disclosed for tracking equipment (100) condition and usage for the purpose of scheduling or avoiding a maintenance visit by service personnel (150). A modem (110) is connected to the equipment (100), which allows for remote communication (140) with the equipment (100), and evaluation of the status of the equipment (100).

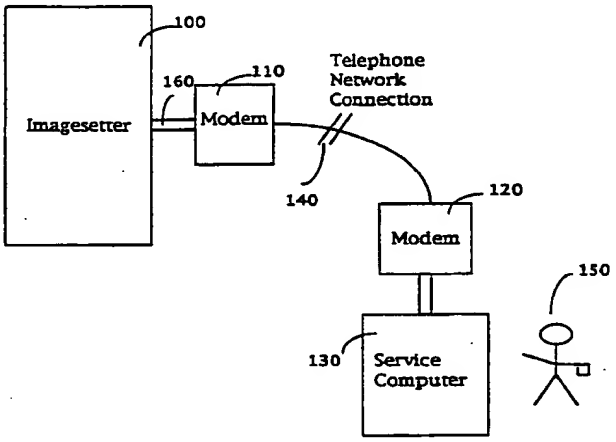


Figure 1

Printed by Rank Xerox (UK) Business Services
2.13.8/3.4

0663623A3 I >

EP 0 663 623 A3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 12 0417

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB-A-2 247 540 (RICOH KK ;RICOH CORP (US)) 4 March 1992 * page 2, line 10 - page 3, line 24 * * page 4, line 24 - page 7, line 11 * * page 12, line 5 - page 13, line 13; claims 1-12; figures 1,2,8 *	1-24	G03G15/00
X	WO-A-92 13295 (EASTMAN KODAK CO) 6 August 1992 * page 3, line 32 - page 5, line 5 * * page 5, line 34 - page 6, line 15 * * page 6, line 26 - page 7, line 27; claims 1,5,9,12; figures 1,2 *	1,6,9, 11,12, 15-24	
A,D	US-A-5 214 772 (WEINBERGER JOSEPH ET AL) 25 May 1993 * column 1, line 25 - column 2, line 17 * * column 4, line 13 - line 23 * * column 7, line 55 - column 8, line 11 * * column 10, line 9 - line 26 * * column 13, line 15 - column 14, line 23; claim 1; figures 1,20 *	1-24	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
G03G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	29 August 1996	Manntz, W

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)